



MacBook Pro 15" Unibody Early 2011 Teardown

Quad-core Intel Core i7 processor and Thunderbolt I/O

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INTRODUCTION

We got our hands on Apple's newest MacBook Pro 15" on February 24, 2011. This is Apple's first laptop to sport a quad-core processor, and also adds a brand-new I/O technology with a Thunderbolt port. Follow us on [Twitter](#) to get all the latest updates.



TOOLS:

- [Phillips #00 Screwdriver](#) (1)
 - [Spudger](#) (1)
 - [T6 Torx Screwdriver](#) (1)
 - [Tri-wing Screwdriver](#) (1)
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Step 1 — MacBook Pro 15" Unibody Early 2011 Teardown



- We got our hands on Apple's latest Unibody laptop. This is Apple's first portable to sport a quad-core processor: Intel's Core i7.
- This machine includes Thunderbolt, a new I/O connection that combines PCI Express and DisplayPort into a single connector.
- Thunderbolt claims to provide 10 Gbps throughput for both input and output. It appears that both PCI Express and DisplayPort receive their own 10 Gbps data channel. That's nice, as you don't want your display competing with your external hard drive for bandwidth.
- You can chain up to 6 Thunderbolt devices including up to 2 HD displays. That's not a problem today as we're not even aware of 6 products that support Thunderbolt yet. If the connection becomes widespread, the 6 device limit might be a problem for some people.
- In comparison, FireWire supports up to 63 devices in a daisy-chain, while USB does not support daisy-chaining.

Step 2



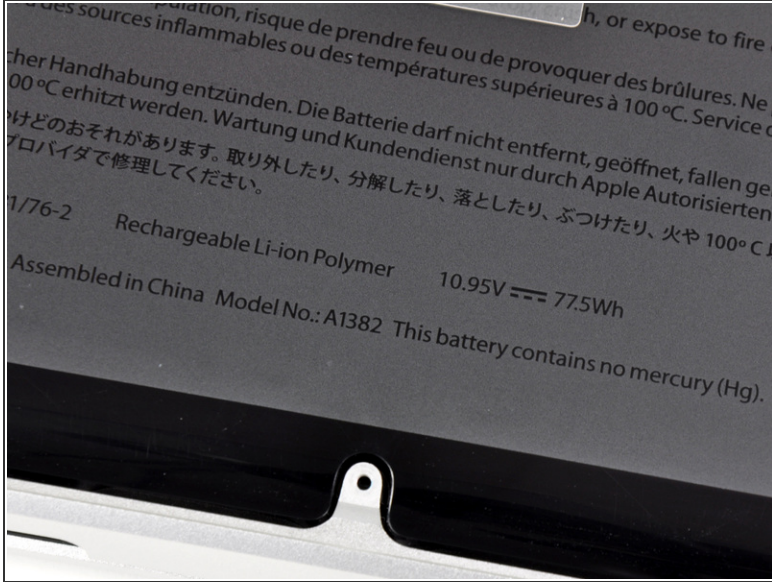
- This machine is still model A1286. Apple's been using that same model number since October 2008.
- Apple still includes the warning to not throw your MacBook Pro in the trash. These warnings were missing on the [Verizon iPhone we took apart a few weeks ago](#).

Step 3



- The lower case is secured by ten Phillips #00 screws. There are no [pentalobe screws](#) since Apple still considers the RAM and hard drive to be user-replaceable. However, like the machine this replaces, the battery is not user-replaceable (at least according to Apple).
- The RAM in this machine is [PC3-10600 RAM](#). That's the same RAM used in the 2010 revision of the 21.5" and 27" iMacs, but different from earlier Apple laptops. PC3-10600 RAM is backwards compatible with the PC3-8500 RAM in older MacBook Pro Unibody machines, but you can't use older PC3-8500 RAM in this machine.

Step 4



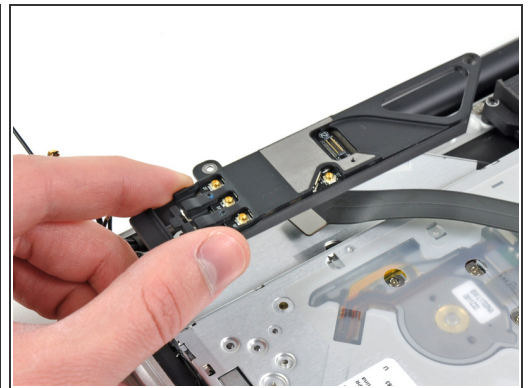
- This machine boasts a 77.5 Watt-hour battery. That's the same capacity as the previous revision, but the reported battery life has gone from 8-9 hours to 7 hours. Has performance really decreased, or is Apple being more realistic with their estimates? We don't have 7 hours to wait and find out, so we'll have to leave that investigation to someone with a fully-assembled unit.
- ① Just like the previous revision, the battery is secured by [Tri-Wing screws](#).

Step 5



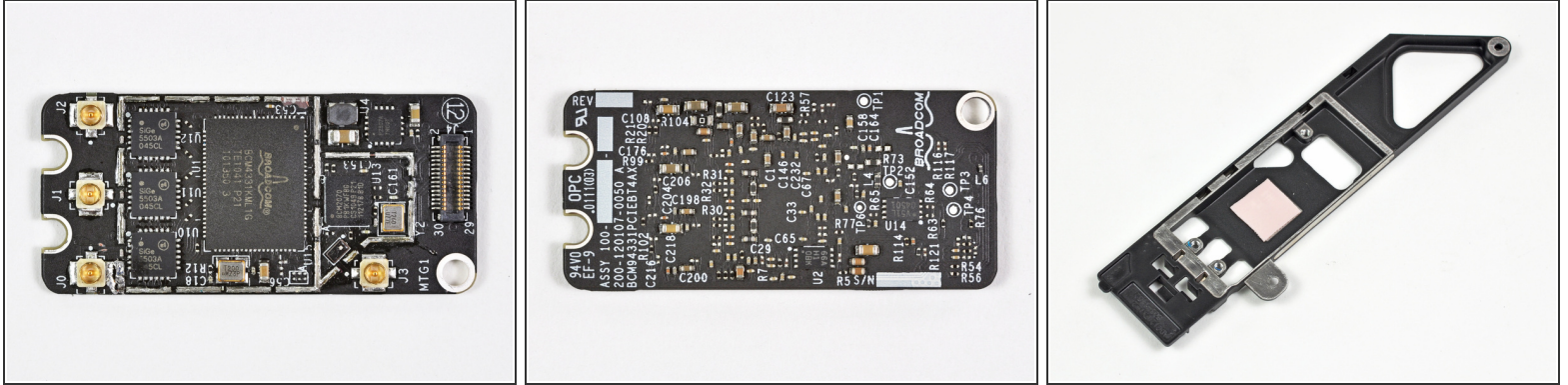
- A [spudger](#) makes disconnecting the battery easy enough.
- On this model, you're able to disconnect the battery without having to remove it from the laptop. It's a nice design choice since you need to disconnect the battery before performing any repairs.

Step 6



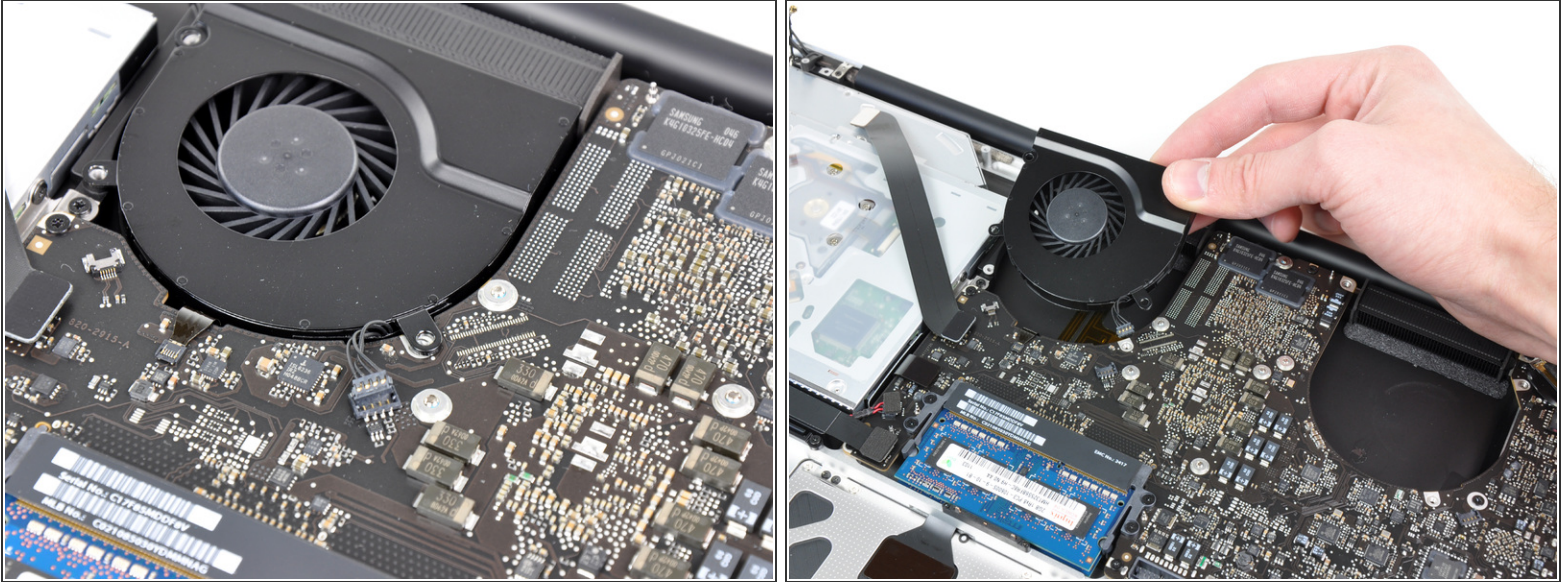
- The wireless card includes support for 802.11n wireless with 3 antennas as well as what seems to be a dedicated antenna for Bluetooth 3.0.

Step 7



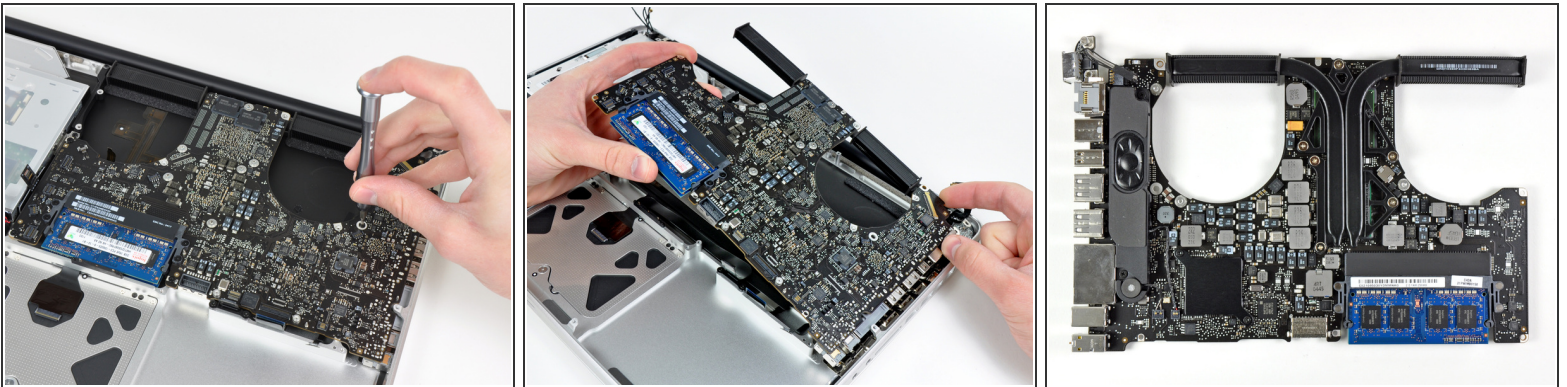
- After removing a soldered EMI shield, we find 802.11n wireless connectivity provided by a Broadcom [BCM4331](#) "Single-Chip 802.11n Dual-Band 3x3 Wireless Solution." Bluetooth 3.0 support is handled by a BCM2070 in a separate, shielded section of the board.
- According to Broadcom, the BCM4331 chip provides "three transmitting and three receiving streams of data in both the 2.4Ghz and 5Ghz bands. Increased number of streams and antennas results in faster speeds, longer range, fewer dropped connections, and better overall wireless coverage."
- The BCM2070 Bluetooth controller is described as follows on the Broadcom site: "The Broadcom BCM2070 is a monolithic, single-chip, stand-alone baseband processor with a high performance integrated 2.4-GHz RF transceiver. It is fully compliant with Bluetooth 3.0 and all prior standard features...using advanced 65-nm LP CMOS technology,"
- The wireless card bracket is aluminum, rather than the plastic in previous revisions. Perhaps this change was made for thermal reasons, as a visible pink thermal pad is used to transfer heat from the board to its aluminum bracket.

Step 8



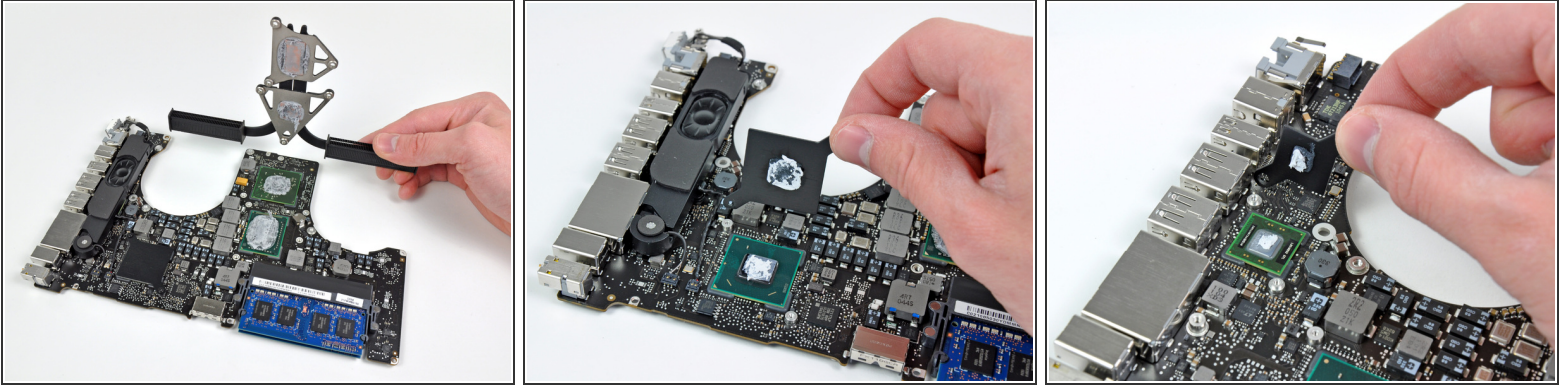
- Like most 15" Unibody laptops, there are two fans. To make sure things stay cool, there's a plethora of temperature sensors scattered throughout the machine, including near the trackpad, in the battery, and on the logic board.

Step 9



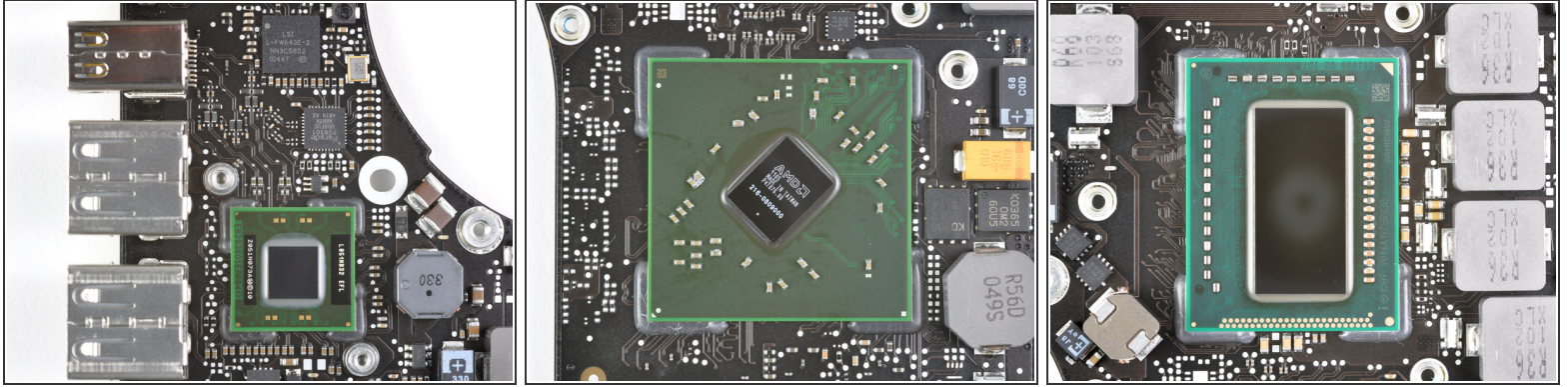
- The main board lifts out along with the heat sink still attached. This is a nice feature, as this way you have to remove the heat sink and reapply thermal paste only if you're completely replacing the logic board.

Step 10



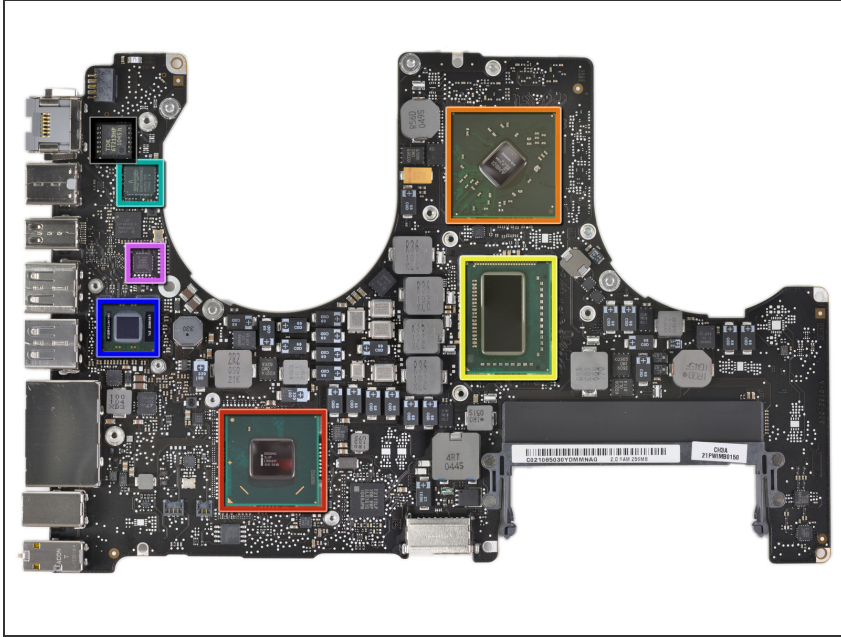
- This machine features not only the large primary heat sink, but also two smaller heat sinks.
- Holy thermal paste! Time will tell if the gobs of thermal paste applied to the CPU and GPU will cause overheating issues down the road.
- The [Mid 2010 15" Unibody](#) was equipped with only one large heat sink to cool just the CPU and GPU. Also for that revision, the graphics switching chip seen in the second image was present, but didn't receive a heat sink.
- The chip under the heat sink in the third image is a new chip that is most likely the Thunderbolt controller.

Step 11



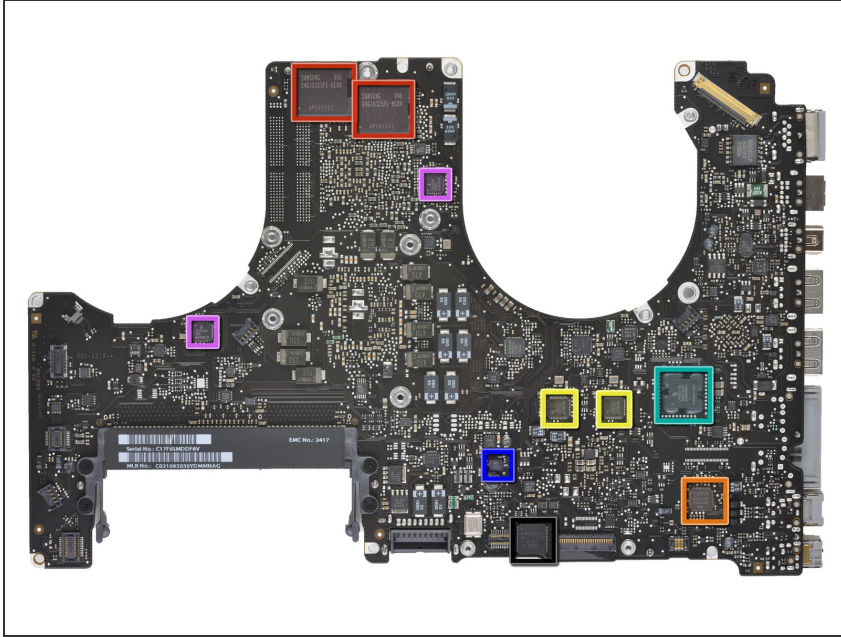
- The Thunderbolt port is shown in the top left corner of the first picture. Also seen are the traces leading to what we think is the Thunderbolt controller IC.
- In the second picture is the AMD Radeon HD 6490M GPU.
- If you're wondering about the AMD GPU, ATI was purchased by AMD in 2006. However, only within the last few months has AMD retired the ATI name and begun branding their graphics chips with AMD.
- In the third picture is the quad-core Intel i7 processor.

Step 12



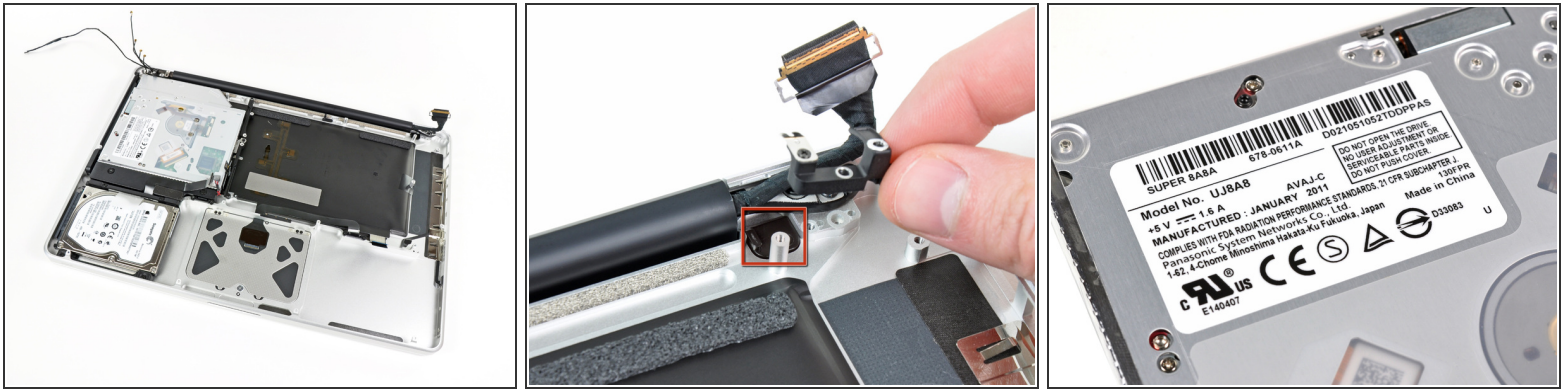
- Front side of the logic board (gigantic version can be seen [here](#)):
- Intel [BD82HM65](#) Platform Controller Hub
- AMD Radeon HD [6490M](#) GPU (labeled as AMD 216-0809000)
- Quad-Core Intel [i7-2630QM](#) Mobile Processor (labeled as 2V041112A0127)
- Broadcom [BCM57765B0KMLG](#) Integrated Gigabit Ethernet and Memory Card Reader Controller
- Intel L051NB32 EFL (we assume this is the Thunderbolt port controller)
- Parade PS8301 U08FUC
- TDK 6T213HF 1045 H

Step 13



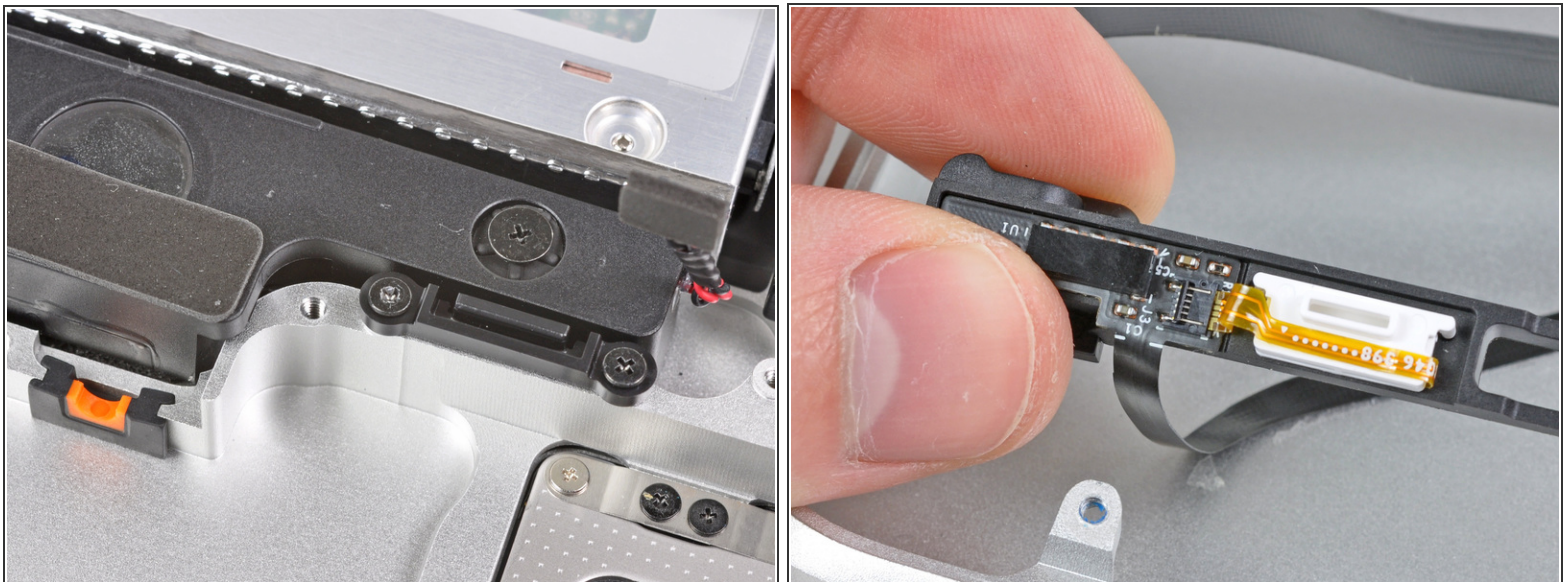
- Back side of the logic board (gigantic version [here](#)):
- Samsung [K4G10325FE-HC04](#) 1 Gb (128 MB) GDDR5 SGRAM graphics memory, a total of 2Gb (256 MB)
- Cirrus 4206ACNZ audio controller
- SMSC [USB25138](#) USB 2.0 Hub Controller Family
- Lattice Semiconductor [LFXP2-5E](#) Low-Cost Non-Volatile FPGA (Field-programmable Gate Array)
- ST Microelectronics 6640 N053
- Intersil [ISL6263 CHRZ](#) and [ISL6236 IRZ](#) Single-Phase Synchronous-Buck PWM voltage regulators for GPU core power applications
- Cypress CY8C24794-24L

Step 14



- Aside from the logic board differences, there really isn't much else that makes this machine different from its 15" Unibody ancestors.
- Small plastic plates adhered near the display hinges seem to keep the display data cable and antenna cable bundle stationary while the display is opened and closed.
- The SuperDrive used on this machine has the model number UJ8A8, making it presumably different from the model UJ898 used in the Mid 2010 15" Unibody.

Step 15



- One thing that has us a little concerned about the new models is their quality control.
- A stripped screw near the subwoofer enclosure and an unlocked ZIF socket for the IR sensor should not be things found inside a completely unmolested computer with an \$1800 base price.

Step 16



REPAIRABILITY SCORE:



- MacBook Pro Unibody 15" Early 2011 Repairability Score: **7 out of 10** (10 is easiest to repair).
- Easily removable bottom panel and readily accessible battery connector allow for easy repair of most components without touching the battery screws.
- Unibody design allows for easy access of most components with minimal amounts of extra work needed to get to them.
- Absurd amounts of pre-applied thermal paste may cause problems down the road.
- Tri-wing screws limit the average person from replacing their own battery.
- LCD replacement is still very tricky, which could easily result in shattering the front glass panel.

To reassemble your device, follow these instructions in reverse order.

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